



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,376	10/07/2005	Hua Chen	H0003955	9276
46507 7590 03/05/2009 HONEYWELL TURBO TECHNOLOGIES 3201 WEST LOMITA BOULEVARD (LAW DEPARTMENT) TORRANCE, CA 90505				
EXAMINER VERDIER, CHRISTOPHER M				
ART UNIT 3745		PAPER NUMBER		
MAIL DATE 03/05/2009		DELIVERY MODE PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/552,376

Applicant(s)

CHEN, HUA

Examiner

Christopher Verdier

Art Unit

3745

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4-6, 9 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-6, 9 and 11-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)
- Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 21, 2009 has been entered.

Applicant's Amendment dated January 21, 2009 has been carefully considered but is non-persuasive. Applicant's amendment to claim 16 to attempt to overcome the rejection thereof under 35 USC 112, second paragraph is appreciated, however claim 16 is indefinite for the reasons set forth later below.

With regard to Applicant's argument that neither Yoshinaga 4,395,197 nor Fabri 3,824,029 disclose compressor wheels with free-ended blades, this argument is correct. However, Mitsubori 5,246,335 discloses this feature, and forming the compressors of Yoshinaga 4,395,197 and Fabri 3,824,029 such that the compressor wheels have free-ended blades would be obvious for the reasons set forth later below.

Applicant's arguments that a person skilled in the art would understand the term "downstream" to define a direction relative to the local flow in a flow stream, that at any given location along the length of the flow stream, the downstream direction will be understood by a person skilled in the art as the direction of flow at that longitudinal location along the flow

stream, that the direction of downstream needs to be understood in light of the flow, that in all of the applicant's figures, the downstream direction is not vertically upward with reference to the direction on the page, but while the right-side wall of the diffuser is a vertical line, the left-side wall is a sloped line such that the net flow is up and to the right on the paper as indicated by a large arrow, and that while the blocking face is a vertical line, it is facing in the downstream direction, and thereby forms a downstream-facing blocking face identified with an A, and because the blocking face is angled to face downstream, it impedes fluid from flowing upstream, are noted. However, both Yoshinaga 4,395,197 and Fabri 3,824,029 disclose these features as set forth below. Note that during patent examination, the pending claims must be interpreted as broadly as their terms reasonably allow. *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). Further, it is improper to import claim limitations from the specification. MPEP 2111.01.

Concerning Applicant's specific argument Yoshinaga 4,395,197 and Fabri 3,824,029 do not disclose discontinuities having a downstream facing blocking face and do not disclose the blocking face forming a sharp edge connecting the blocking face to a curving surface upstream of the blocking face, the examiner respectfully disagrees. Yoshinaga discloses a discontinuity B having a downstream facing blocking face, with the blocking face forming a sharp edge connecting the blocking face to a curving surface C upstream of the blocking face. Fabri discloses a discontinuity B having a downstream facing blocking face, with the blocking face forming a sharp edge connecting the blocking face to a curving surface C upstream of the blocking face. Applicant's argument that neither Yoshinaga nor Fabri disclose discontinuities

located along the gas flow path gas flow path through which the compressor blades are rotating to pressurize the air, but rather they are located outside of the rotating shroud, is not persuasive. The above-identified discontinuities in both Yoshinaga and Fabri are clearly located along the gas flow path gas flow path through which the compressor blades are rotating to pressurize the air, as one skilled in the art would readily recognize from the figures thereof.

Finally, with regard to Applicant's argument that the claims have been amended to recite that the compressor blades are free-ended and each blade has a free-ended outer edge, and that this is not simply the elimination of an element and its function, the examiner respectfully disagrees. Applicant's statement that it may be unobvious to omit an element to have the eliminated feature while retaining its function as set forth in MPEP 2144.04 (II)(B), and *In re Edge*, is fact-specific. Eliminating the shroud elements (24 and 7, respectively) of the compressor wheels in Yoshinaga 4,395,197 and Fabri 3,824,029 would not retain the function, and would actually change the function, since the flowpath through the compressors of both of these references would be changed by elimination of the shroud elements, in terms of smoothness and pressure. Note that omission of an element and retention of its function is obvious if the function of the element is not desired. *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989); *In re Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965); *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975). Applicant's argument that a person skilled in the art would not change a shrouded wheel to have free-ended blades unless they also reshaped the housing to conform with known shroud technology (i.e., that is smooth), is not persuasive since this is a conclusory argument with no evidence. With regard to Applicant's argument that the

discontinuities in the cited art are only there to accommodate features of the rotating shroud, and a person skilled in the art would not maintain such discontinuities if the shroud were eliminated, the newly cited reference to Mitsubori teaches this feature, as well as the reference to Jones 3,893,787 (of record).

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Amended claim 1, lines 2-4, which recite that the compressor blades are free-ended and have a free-ended outer edge, do not appear in the specification.

It is suggested that the specification be amended to state these features, in order to overcome the objection to the specification as failing to provide proper antecedent basis for the claimed subject matter.

Claim Objections

Claims 13-14 are objected to because of the following informalities: Appropriate correction is required.

In claim 13, line 2, -- , -- should be inserted after “4”.

In claim 14, line 2, -- , -- should be inserted after “4”.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 16, which recites that the blocking face forms a second sharp edge on an opposite side of the blocking face from the first sharp edge, the second sharp edge connecting the blocking face to a smoothly curving surface downstream of the discontinuity, is ambiguous and inaccurate. Firstly, the recitation in claim 16, lines 4-5 of “a smoothly curving surface downstream of the discontinuity” is a double recitation of the smoothly curving surface 4 along the gas flow path upstream of the discontinuity (see figure 3, for example) recited in claim 1, the second to last line. Secondly, the blocking face shown generally at 12 in figure 3, for example, does not form a second sharp edge on an opposite side of the blocking face from the first sharp edge, the second sharp edge connecting the blocking face to a smoothly curving surface downstream of the discontinuity, rather the blocking face shown generally at 22 in figure 3 performs this function. In claim 17, all recitations of “the first blocking face” are unclear if this refers to the blocking face in claim 1, the fifth to last line, since claim 1 does not use the term “first” to characterize the blocking face. Claim 17, which recites that the first blocking face forms a second sharp edge on an opposite side of the first blocking face from the first sharp edge of the first blocking face, the second sharp edge connecting the first blocking face to a smoothly curving surface downstream of the second discontinuity, is ambiguous and inaccurate. The first

blocking face (shown generally at 12 in figure 3) does not form a second sharp edge on an opposite side of the first blocking face from the first sharp edge of the first blocking face, since the second sharp edge belongs to the element shown generally at 22 in figure 3, and does not connect the first blocking face to a smoothly curving surface downstream of the second discontinuity. Additionally, the recitation in claim 17, lines 4-5 of “a smoothly curving surface downstream of the discontinuity” is a double recitation of the smoothly curving surface 4 along the gas flow path upstream of the discontinuity (see figure 3, for example) recited in claim 1, the second to last line.

Claim Rejections - 35 USC § 102

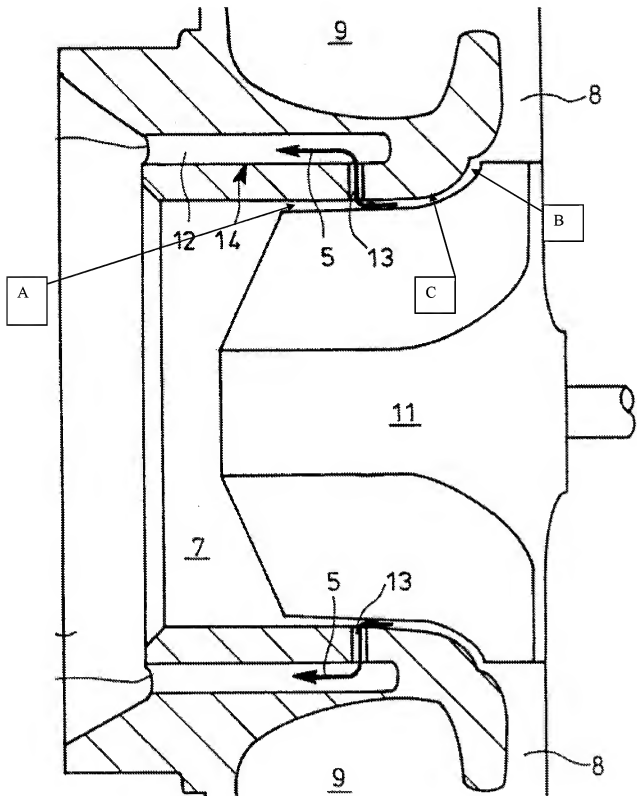
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 15/1, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Mitsubori 5,246,335 (figure 2). Disclosed is a compressor comprising a compressor wheel having a hub 11, unnumbered free-ended compressor blades and being mounted for rotation on an unnumbered shaft, each blade being characterized by a free-ended outer edge, an upstream leading edge and a downstream trailing edge, and a shroud 4 mounted adjacent and around the outer edges of the compressor blades and defining a gas flow path between the shroud and the hub from a compressor inlet 6 to a diffuser outlet 8, through which the blades rotate with respect

to the shroud, wherein in cross-section the shroud forms a surface A along the flow path, the surface being characterized by a profile that includes a relative discontinuity B in the region of the trailing edge, wherein the discontinuity forms a downstream-facing blocking face adapted to impede an upstream flow of gas between the shroud and the wheel, the blocking face extending across the flow path to form a sharp edge connecting the blocking face to a smoothly curving surface C along the gas flow path upstream of the discontinuity. The compressor is included with a turbocharger. The discontinuity is in the form of a groove. Note the annotated figure below.



Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

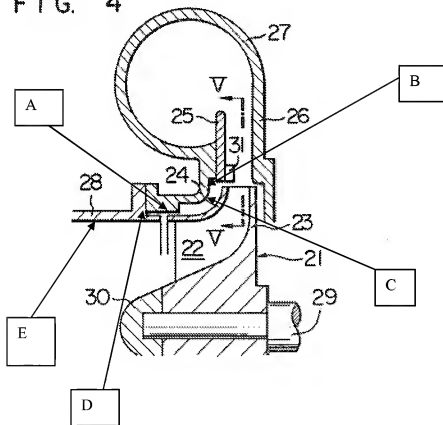
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 5, 6, 9, 11, 12/6, 13/6, 14/6, 15/6, 12/9, 13/9, 14/9, 12/4, 13/4, 14/4, 15/1, 15/4, 15/11, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshinaga 4,395,197 in view of Jones 3,893,787. Yoshinaga disclosed a compressor substantially as claimed, comprising a compressor wheel 21 having a hub 1, compressor blades 22 and being mounted for rotation on a shaft 29, each blade being characterized by an outer edge, an upstream leading edge and a downstream trailing edge, and a shroud 27/28 mounted adjacent (note that adjacent does not require that two elements be immediately next to one another) and around the outer edges of the compressor blades and defining a gas flow path between the shroud and the hub from a compressor inlet to a diffuser outlet, through which the blades rotate with respect to the shroud, wherein in cross-section the shroud forms a surface A along the flow path, the surface being characterized by a profile that includes a relative discontinuity B in the region of the trailing edge, wherein the discontinuity forms a downstream-facing blocking face adapted to impede an upstream flow of gas between the shroud and the wheel, the blocking face extending across the flow path to form a sharp edge connecting the blocking face to a smoothly curving

surface C along the gas flow path upstream of the discontinuity. The cross-section profile of the shroud surface along the flow path is further characterized by a second relative discontinuity D that is in the region of the leading edge, wherein the second relative discontinuity forms a second downstream-facing blocking face adapted to impede an upstream flow of gas between the shroud and the wheel, the second blocking face extending across the flow path to form a sharp edge connecting the second blocking face to a second smooth surface E upstream of the second discontinuity. The second discontinuity is located upstream of the leading edge of the wheel blades. The second discontinuity is spaced from the leading edge of the wheel blades by a distance of the same order as the axial clearance of the trailing edge from the compressor housing. The or each downstream-facing blocking face comprises a planar surface cut into the curving surface. The second downstream-facing blocking face comprises a planar surface cut into the curving surface, and the planar surface is perpendicular to the axis of the shaft. The radial extent of the second discontinuity is of the same order as the radial clearance between the trailing edge and the housing. The sizes of the first and second discontinuities are closely similar. The discontinuity is in the form of a groove. The shapes of the first and second discontinuities are closely similar. Concerning claim 15, the term “turbocharger” is recited in the preamble of the claim and has not been given patentable weight. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Note the annotated figure below.

However, Yoshinaga does not disclose that the compressor blades are free-ended, with each blade having a free-ended outer edge (claim 1). Rather, the compressor blades have a shroud 24.

FIG. 4



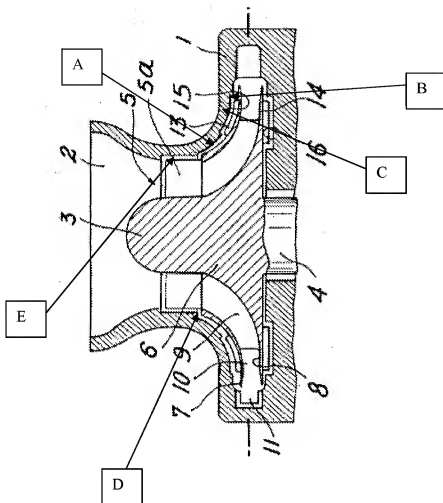
Jones shows a compressor 1 having a compressor wheel having a hub 4 with free-ended compressor blades 6 mounted for rotation on a shaft 12, each blade being characterized by a free-

ended outer edge, an upstream leading edge and a downstream trailing edge. The inside of a stationary shroud 8 may be provided with grooves 20. The flowpath along the shroud is non-uniform. Therefore, Jones teaches the combination of a compressor having a shroud having a non-uniform flowpath and compressor blades that are free-ended, with each blade having a free-ended outer edge, for the purpose of reducing rotating mass of the compressor wheel.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to remove the shroud from the compressor wheel of Yoshinaga such that the compressor blades are free-ended, with each blade having a free-ended outer edge, as taught by Jones, for the purpose of reducing rotating mass of the compressor wheel.

Claims 1, 4, 5, 9, 11, 13/9, 14/9, 13/4, 14/4, 15/1, 15/4, 15/11, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabri 3,824,029 in view of Jones 3,893,787. Fabri discloses a compressor substantially as claimed, comprising a compressor wheel 3/6 having a hub 3 and compressor blades 9 and being mounted for rotation on a shaft 4, each blade being characterized by an outer edge, an upstream leading edge and a downstream trailing edge, and a shroud 1 mounted adjacent (note that adjacent does not require that two elements be immediately next to one another) and around the outer edges of the compressor blades and defining a gas flow path between the shroud and the hub from a compressor inlet to a diffuser outlet, through which the blades rotate with respect to the shroud, wherein in cross-section the shroud forms a surface A along the flow path, the surface being characterized by a profile that includes a relative discontinuity B in the region of the trailing edge, wherein the discontinuity forms a downstream-

facing blocking face adapted to impede an upstream flow of gas between the shroud and the wheel, the blocking face extending across the flow path to form a sharp edge connecting the blocking face to a smoothly curving surface C along the gas flow path upstream of the discontinuity. The cross-section profile of the shroud surface along the flow path is further characterized by a second relative discontinuity D that is in the region of the leading edge, wherein the second relative discontinuity forms a second downstream-facing blocking face adapted to impede an upstream flow of gas between the shroud and the wheel, the second blocking face extending across the flow path to form a sharp edge connecting the second blocking face to a second smooth surface E upstream of the second discontinuity. The second discontinuity is located upstream of the leading edge of the wheel blades. The or each downstream-facing blocking face comprises a planar surface cut into the curving surface. The second downstream-facing blocking face comprises a planar surface cut into the curving surface, and the planar surface is perpendicular to the axis of the shaft. The sizes of the first and second discontinuities are closely similar. The shapes of the first and second discontinuities are closely similar. Concerning claim 15, the term “turbocharger” is recited in the preamble of the claim and has not been given patentable weight. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Note the annotated figure below.



However, Fabri does not disclose that the compressor blades are free-ended, with each blade having a free-ended outer edge (claim 1). Rather, the compressor blades have a shroud 7.

Jones shows a compressor 1 having a compressor wheel having a hub 4 with free-ended compressor blades 6 mounted for rotation on a shaft 12, each blade being characterized by a free-ended outer edge, an upstream leading edge and a downstream trailing edge. The inside of a stationary shroud 8 may be provided with grooves 20. The flowpath along the shroud is non-uniform. Therefore, Jones teaches the combination of a compressor having a shroud having a

non-uniform flowpath and compressor blades that are free-ended, with each blade having a free-ended outer edge, for the purpose of reducing rotating mass of the compressor wheel.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to remove the shroud from the compressor wheel of Fabri such that the compressor blades are free-ended, with each blade having a free-ended outer edge, as taught by Jones, for the purpose of reducing rotating mass of the compressor wheel.

Claims 16 and 17, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabri 3,824,029 and Jones 3,893,787 as applied to claims 1 and 4, respectively above, and further in view of Trumpler 2,471,174. The modified compressor of Fabri shows a compressor substantially as claimed as set forth above, including the blocking face at B forming a second sharp edge on an opposite side of the blocking face from the first sharp edge, but does not show that the second sharp edge connects the blocking face to a smoothly curving surface downstream of its respective discontinuity.

Trumpler shows a centrifugal compressor having a blocking face (unnumbered, attached to C and opposite 34a) forming a second sharp edge on an opposite side of the blocking face from a first sharp edge, the second sharp edge connecting the blocking face to a smoothly curving surface 5a downstream of its respective discontinuity, for the purpose of providing recirculation to prevent surge.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified compressor of Fabri such that the second sharp edge connects the blocking face to a smoothly curving surface downstream of its respective discontinuity, as taught by Trumpler, for the purpose of providing recirculation to prevent surge.

Claims 1, 4, 5, 6, 9, 11, 12/6, 13/6, 14/6, 15/6, 12/9, 13/9, 14/9, 12/4, 13/4, 14/4, 15/1, 15/4, 15/11, and 18 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshinaga 4,395,197. Yoshinaga discloses a compressor substantially as claimed as previously set forth above, but does not disclose that the compressor blades are free-ended, with each blade having a free-ended outer edge (claim 1). Rather, the compressor blades have a shroud 24.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to remove the shroud from the compressor wheel of Yoshinaga such that the compressor blades are free-ended, with each blade having a free-ended outer edge, for the purposes of reducing the rotating mass and cost of the compressor wheel, providing flexibility to the compressor wheel by virtue of the free-ended blades, and changing the flowpath through the compressor shroud. Note that omission of an element and its function is obvious if the function of the element is not desired. *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989); *In re Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965); *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975). Since the mass, cost, flexibility and flowpath through the compressor shroud are changed, the above case law applies.

Claims 1, 4, 5, 9, 11, 13/9, 14/9, 13/4, 14/4, 15/1, 15/4, 15/11, and 81 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Fabri 3,824,029. Fabri discloses a compressor substantially as claimed as previously set forth above, but does not disclose that the compressor blades are free-ended, with each blade having a free-ended outer edge (claim 1). Rather, the compressor blades have a shroud 7.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to remove the shroud from the compressor wheel of Fabri such that the compressor blades are free-ended, with each blade having a free-ended outer edge, for the purposes of reducing the rotating mass and cost of the compressor wheel, providing flexibility to the compressor wheel by virtue of the free-ended blades, and changing the flowpath through the compressor shroud. Note that omission of an element and its function is obvious if the function of the element is not desired. *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989); *In re Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965); *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975). Since the mass, cost, flexibility and flowpath through the compressor shroud are changed, the above case law applies.

Claims 16 and 17, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabri 3,824,029 as applied to claims 1 and 4, respectively above, and further in view of Trumpler 2,471,174. The modified compressor of Fabri shows a compressor substantially as claimed as set forth above, including the blocking face at B forming a second sharp edge on an opposite side of the blocking face from the first sharp edge, but does

not show that the second sharp edge connects the blocking face to a smoothly curving surface downstream of its respective discontinuity.

Trumpler shows a centrifugal compressor having a blocking face (unnumbered, attached to C and opposite 34a) forming a second sharp edge on an opposite side of the blocking face from a first sharp edge, the second sharp edge connecting the blocking face to a smoothly curving surface 5a downstream of its respective discontinuity, for the purpose of providing recirculation to prevent surge.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified compressor of Fabri such that the second sharp edge connects the blocking face to a smoothly curving surface downstream of its respective discontinuity, as taught by Trumpler, for the purpose of providing recirculation to prevent surge.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher Verdier whose telephone number is (571) 272-4824. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward K. Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Verdier/
Primary Examiner, Art Unit 3745

Christopher Verdier
Primary Examiner
Art Unit 3745